

CLAIMS

What is claimed is:

1. An electrical wire comprising:
5 at least one electrifiable conductor; and
first and second return conductors which are respectively formed on opposing sides of
said at least one electrifiable conductor, such that said at least one electrifiable conductor is at
least substantially entrapped by said first and second return conductors.
- 10 2. The electrical wire according to claim 1, further comprising:
first and second insulating layers which are formed between said at least one electrifiable
conductor and said first and second return conductors, respectively.
3. The electrical wire according to claim 1, wherein said at least one electrifiable conductor
15 and said first and second return conductors comprise substantially flat conductive layers having a
stacked arrangement.
4. The electrical wire according to claim 3, wherein a distance between said at least one
electrifiable conductor and each of said first and second return conductors is no greater than
20 about 0.030 inches.

5. The electrical wire according to claim 1, wherein said first and second return conductors contact each other along a longitudinal edge of said electrical wire, such that said electrifiable conductor is completely entrapped by said first and second return conductors.

5 6. The electrical wire according to claim 1, wherein said first and second return conductors are treated by at least one of a mechanical, chemical and thermal treatment to form a protective longitudinal edge of said electrical wire, said protective edge inhibiting a foreign object from penetrating said electrical wire and contacting said Electrifiable conductor without contacting one of said first and second return conductors.

10 7. The electrical wire according to claim 2, wherein said first and second insulating layers, contact each other along a longitudinal edge of said electrical wire.

8. The electrical wire according to claim 7, wherein said first and second insulating layers
15 are treated by at least one of a mechanical, chemical and thermal treatment to form a protective longitudinal edge of said electrical wire, said protective edge inhibiting a foreign object from penetrating said electrical wire and contacting said Electrifiable conductor.

9. The electrical wire according to claim 2, further comprising:

20 an outer insulating layer formed on said first and second return conductors.

10. An electrical wire comprising:

at least one electrifiable conductor;

first and second insulating layers formed on opposing sides of said at least one electrifiable conductor;

5 first and second return conductors formed on said first and second insulating layers, respectively, such that said at least one electrifiable conductor is at least substantially entrapped by said first and second return conductors;

third and fourth insulating layers formed on said first and second return conductors, respectively;

10 first and second grounding conductors formed on said third and fourth insulating layers, respectively; and

fifth and sixth insulating layers formed on said first and second grounding conductors, respectively.

11. The electrical wire according to claim 10, wherein said first and second return conductors
15 are treated by at least one of a mechanical, chemical and thermal treatment to form a protective longitudinal edge of said electrical wire, said protective edge inhibiting a foreign object from penetrating said electrical wire and contacting said Electrifiable conductor without contacting one of said first and second return conductors.

20 12. The electrical wire according to claim 10, wherein an area between said first and second return conductors forms a hot zone, said at least one electrifiable conductor being disposed within said hot zone.

13. The electrical wire according to claim 12, wherein said at least one Electrifiable conductor comprises a plurality of Electrifiable conductors which are formed in said hot zone and comprise a plurality of horizontal segments across a width of said wire and a plurality of
5 vertical segments across a thickness of said wire.

14. The electrical wire according to claim 13, wherein at least one segment in said plurality of horizontal segments of said Electrifiable conductors is used to transmit a communication signal, and

10 wherein at least one segment in said plurality of horizontal segments of said Electrifiable conductors is used to supply one of AC and DC electrical power.

15. The electrical wire according to claim 14, wherein said communication signal comprises one of a voice communication signal and a data communication signal.

16. The electrical wire according to claim 10, wherein a capacitance formed between said at least one Electrifiable conductor and said first and second return conductors is given as $C = 1.5 \cdot W \cdot L \cdot \epsilon / d$, where W is the width of the return and electrifiable conductors, L is the length of the return and electrifiable conductors, ϵ is the dielectric constant for the first and second insulating
20 layers, and d is the distance between each of the return and electrifiable conductors.

17. The electrical wire according to claim 10, further comprising:

an adhesive for bonding adjacent insulation layers and conductors in said electrical wire.

18. The electrical wire according to claim 10, wherein an object penetrating an outer surface of said electrical wire contacts one of said first and second grounding conductors and one of said first and second return conductors, before contacting said at least one Electrifiable conductor.

19. The electrical wire according to claim 10, wherein said first and second grounding conductors inhibit power transmission signals and load-generated electrical noise from being emitted from said electrical wire.

20. The electrical wire according to claim 10, wherein said first and second return conductors and said first and second grounding conductors comprise a rate of heat dissipation which is greater than a rate of heat dissipation for an round conductor, for a given cross-sectional area.

21. The electrical wire according to claim 10, wherein said electrical wire comprises one of alternating current (AC) electrical wire and direct current (DC) electrical wire for supplying an electrical current having potential of greater than 0V.

22. The electrical wire according to claim 10, wherein said electrical wire comprises surface-mountable electrical wire.

23. The electrical wire according to claim 10, wherein said first and second return conductors each have a thickness T_G , and said first and second grounding conductors each have a thickness T_N , and said Electrifiable conductor has a thickness T_H , such that a ratio of thicknesses $R = (T_G + T_N)/T_H$ is at least 1.00

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24. An electrical wire comprising:

at least one electrifiable conductor;

a first insulating layer formed around said at least one electrifiable conductor;

a return conductor formed around said first insulating layer, such that said at least one

10 electrifiable conductor is at least substantially entrapped by said return conductor; and

a second insulating layer formed around said return conductor.

25. The electrical wire according to claim 24, further comprising:

a grounding conductor formed around said second insulating layer; and

15 a third insulating layer formed around said grounding conductor.

26. The electrical wire according to claim 24, wherein said electrifiable conductor, said return conductor and said grounding conductor comprise one of substantially curvilinear-shaped cross-sectional geometries and substantially rectilinear cross-sectional geometries.

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27. The electrical wire according to claim 24, wherein said electrifiable conductor, said return conductor and said grounding conductor are formed in substantially parallel planes.

28. The electrical wire according to claim 24, wherein said electrical wire comprises a substantially flat electrical wire having a total thickness of no more than about 0.050 inches.

5 29. The electrical wire according to claim 24 wherein said electrifiable conductor, said return conductor and said grounding conductor comprise substantially oval-shaped conductors.

30. A method of fabricating an electrical wire, comprising:

forming at least one electrifiable conductor; and

10 forming first and second return conductors on opposing sides of said at least one electrifiable conductor, such that said at least one electrifiable conductor is at least substantially entrapped by said return conductors.

31. An electrical current delivery system comprising the electrical wire of claim 1.

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32. An electrical signal transmission system comprising the electrical wire of claim 1.